

## Determination of the Onset of Yolk Deposition in Lizards

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POPULATION studies of various lizard species have described the female reproductive cycle either from examination of ovaries in preserved specimens (Tinkle, 1961; Mayhew, 1963, 1965, 1966a, 1966b; Telford, 1969) or by observation of living females in the field (Blair, 1960; Harris, 1964). The former method is most precise and furnishes detailed data on all aspects of the ovarian cycle. However, it necessitates removal of individuals from the study population, or extrapolation from data obtained by sampling adjacent populations. No techniques have yet been devised which permit workers to determine the timing of early events in the ovarian cycle from living lizards in the field.

During my studies on the parasitology of various lizard populations in California, Japan, and Panama, blood smears were routinely made from all specimens captured, by clipping toes prior to killing the lizards for autopsies. I noticed upon many occasions that a peculiar staining reaction occurred on some of the slides, a reaction immediately obvious without the use of a microscope. Giemsa-stained thin blood smears characteristically appear bluish-gray to the naked eye. In those which attracted my attention as presenting an odd staining reaction, the smears appeared reddish, a deep pink to brick-red. Upon microscopic examination, a reddish precipitate was found adhering to the glass in the spaces between blood cells. Blood cells stained fairly normally, but the reddish precipitate often obscured an otherwise acceptable stain.

Upon checking the sex of specimens which produced reddish stains, all were found to be female. This immediately suggested a correlation with reproductive condition. A series of 141 slides made from the Japanese lacertid *Takydromus tachydromoides* during its reproductive season, April-May 1967, were examined, and condition of the stain noted. Forty-one presented the abnormal, reddish stain, and 100 appeared bluish-gray. All 41 with red stains were female.

Examination of ovaries from the 41 females revealed that yolked follicles ranging in size from 1.8-7.6 mm diameter were present in 37, three had oviductal eggs without yolked follicles, and five con-

tained both yolked follicles and oviductal eggs. Five of the 100 lizards with normal blood smears were females, all between 39 and 45 mm snout-vent length (SV). Only one of these contained yolked follicles, a female 43 mm SV, and the follicles were small, 1.6-1.9 mm diameter. The remaining 95 lizards were adult and juvenile males.

Adult female *Takydromus tachydromoides* emerge from hibernation in the last week of March or first week of April with small yolked follicles (Telford, 1969). Vitellinogenesis for clutch one increases sharply in rate during the latter half of April (Telford, 1970). Clutch one is deposited in May, clutch two in June, and clutch three in early July. Hatchling females of the previous fall reach maturity at 41-45 mm SV, usually in May (Telford, 1969) or early June. Their first clutch is deposited in early June and their second or third, depending upon when they reach maturity, in late July.

Slides with reddish precipitates were not obtained from females prior to mid-April or from August to hibernation in late October. It is a reasonable conclusion that this reddish precipitate results from lipid materials mobilized during vitellinogenesis, and that its appearance in a lizard population heralds the onset of vitellinogenesis of the ovarian follicles in sexually mature females.

This method may prove to be of general use with all groups of lizards. Twenty-five species of eight families in which I have observed this correlation between reddish stains and active female reproduction include the following: Gekkonidae, *Lepidodactylus lugubris*, *Thecadactylus rapicaudus*, *Gehyra mutilata*, *Hemidactylus frenatus*; Sphaerodactylidae, *Gonatodes albogularis fuscus*; Xantusiidae, *Lepidophyma flavimaculatum*; Iguanidae, *Uta stansburiana*, *Sceloporus graciosus*, *Anolis biporcatus*, *A. limifrons*, *A. tropidogaster*, *A. frenatus*, *A. auratus*, *A. lionotus*, *A. poecilopus*, *Polychrus gutturosus*, *Corytophanes cristatus*; Teiidae, *Ameiva ameiva*, *Gymnophthalmus speciosus*; *Leposoma rugiceps*; Lacertidae, *Takydromus smaragdinus*; Agamidae, *Japalura polygonota*; Scincidae, *Eumeces laticeps*, *Lygosoma pellopleurum*, *Mabuya mabouya*. The reddish stain has been noted more casually in many other species than those mentioned. Final evaluation of the technique, however, awaits its use in a specific field study designed to test its significance.

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